T. E.

Model CP-5/6

POWER AMPLIFIER

(LING 330)

LTV

LING-TEMCO-VOUGHT, INC.

LING

ELECTRONICS DIVISION

INSTRUCTION MANUAL

MP MASTER

MA34236

Model
CP-516
POWER AMPLIFIER

IN ALL CORRESPONDENCE WITH THE FACTORY BE SURE TO INCLUDE THE FOLLOWING INFORMATION:

EQUIPMENT MODEL NUMBER

SERIAL NO. 238

LING NO. 42521

LING ELECTRONICS Division
LING-TEMCO-VOUGHT, INC.
1515 So. Manchester Avenue
Anaheim, California

112-3

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SECTION 1
DESCRIPTION AND CHARACTERISTICS

1-1. GENERAL

a. The Ling Electronics Model CP-5/6 Power Amplifier is a high power audio amplifier, capable of supplying a power output of 5 KVA. The unit is designed for vibration testing applications in a 5 to 10,000 cps frequency range. This operation and maintenance manual contains data relative to the amplifier; separate manuals are provided for accessory equipment.

b. Interlock switches (actuated by the rear access doors) are provided for the safety of operating and maintenance personnel. Circuit breakers provide overload protection for the components in the unit. The customer supplied 480 vac 30 amp external breaker should have a shunt trip wired into the amplifier interlock circuit. Sequenced switching prohibits improper operation, thereby protecting the equipment.

c. The CP-5/6 is designed to provide the user with a compact, integrated vibration testing unit, combining high performance with simplicity of operation.

1-2. PURPOSE

The purpose of the Model CP-5/6 Power Amplifier is to amplify sine wave signals in a variable audio frequency and amplitude range up to the full rated capacity of associated shaker equipment.

1-3. GENERAL EQUIPMENT

a. Preamplifier

b. High Voltage Power Supply

c. Output Transformer

d. Blowers

e. Relays, Interlocks, Operating Controls, Circuit Breakers

f. Meters

1-4. SPECIFICATIONS

a.	Power requirements	12 KVA at 420, 440, 460, 480, or 500 v, 60 cps, 3 ϕ (Amplifier only). Total power depends on system.
b.	Plate dissipation	6 kw Continuous
c.	Power output	5 KVA
d.	Distortion	1% - 50 - 3000 cps. 3% - 20 - 7000 cps.
e.	Frequency response	Flat within plus or minus 1 db, from 10 - 10,000 cps.
f.	Duty cycle	Continuous duty at full output.
g.	Full output current available	5 to 10,000 cps.
h.	Full output voltage available	30 to 10,000 cps.
i.	Hum and noise	65 db below rated full output.

j. Input signal voltage . . . . . 1.0 volt rms from 600 ohm source, for full power output.

k. Cooling . . . . . Forced air, 400 cfm, 55° F. rise (max).

l. Field supply . . . . . As required by shaker

m. Weight . . . . . 1420 pounds total

TABLE 1-1 TUBE COMPLEMENT

DESIGNATION	TYPE	FUNCTION
3V1	3X3000F1	Power amplifier
3V2	3X3000F1	Power amplifier

SECTION 2
OPERATION

2-1. INSTALLATION (see figure 2-1)

a. The Model CP-5/6 Power Amplifier is contained in a three compartment desk type console. All necessary operating controls are accessible from the front panels of the console.

b. Initial installation of Ling Electronics power amplifiers and vibration testing systems is normally accomplished by the customer. The customer is also responsible for supplying the necessary space, materials, and interconnections. When technical assistance is required, arrangements may be made for Ling Field Service personnel to assist in checkout test or briefing instructions.

c. Locate the amplifier in a well ventilated dry area, free of metallic dust or chips. Allow enough clearance behind the amplifier for easy access to the cubicles.

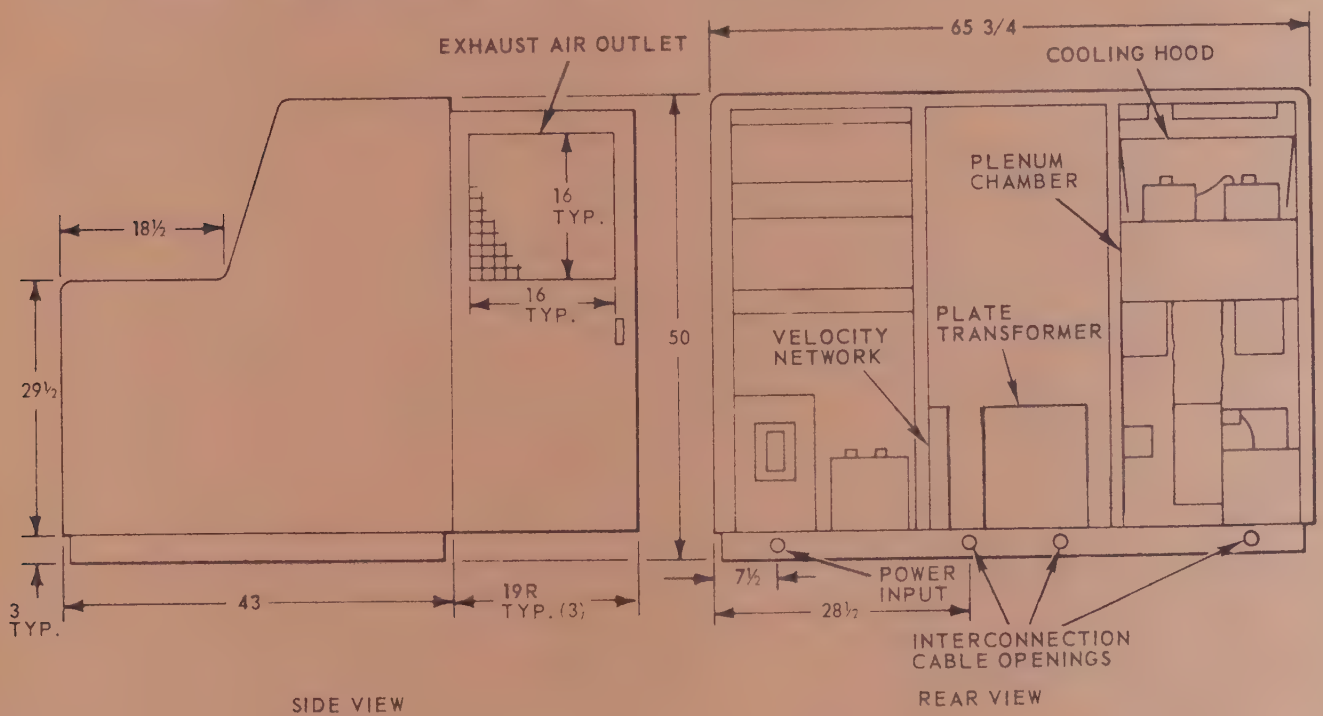

Fig. 2-1 Model CP-5/6, Dimensional Drawing

2-2. OPERATING PROCEDURES (see figure 2-2)

a. Make the following visual checks before operating the CP-5/6 Amplifier:

(1). Check for proper primary power availability.

NOTE

CONNECTION SHOULD BE CHECKED (DURING INSTALLATION) TO INSURE THAT CORRECT WIRING HAS BEEN MADE.

(2). Check the rear doors for proper closure.

(3). Check for correct shaker to amplifier interconnections.

(4). Check for specimens that might be damaged through testing.

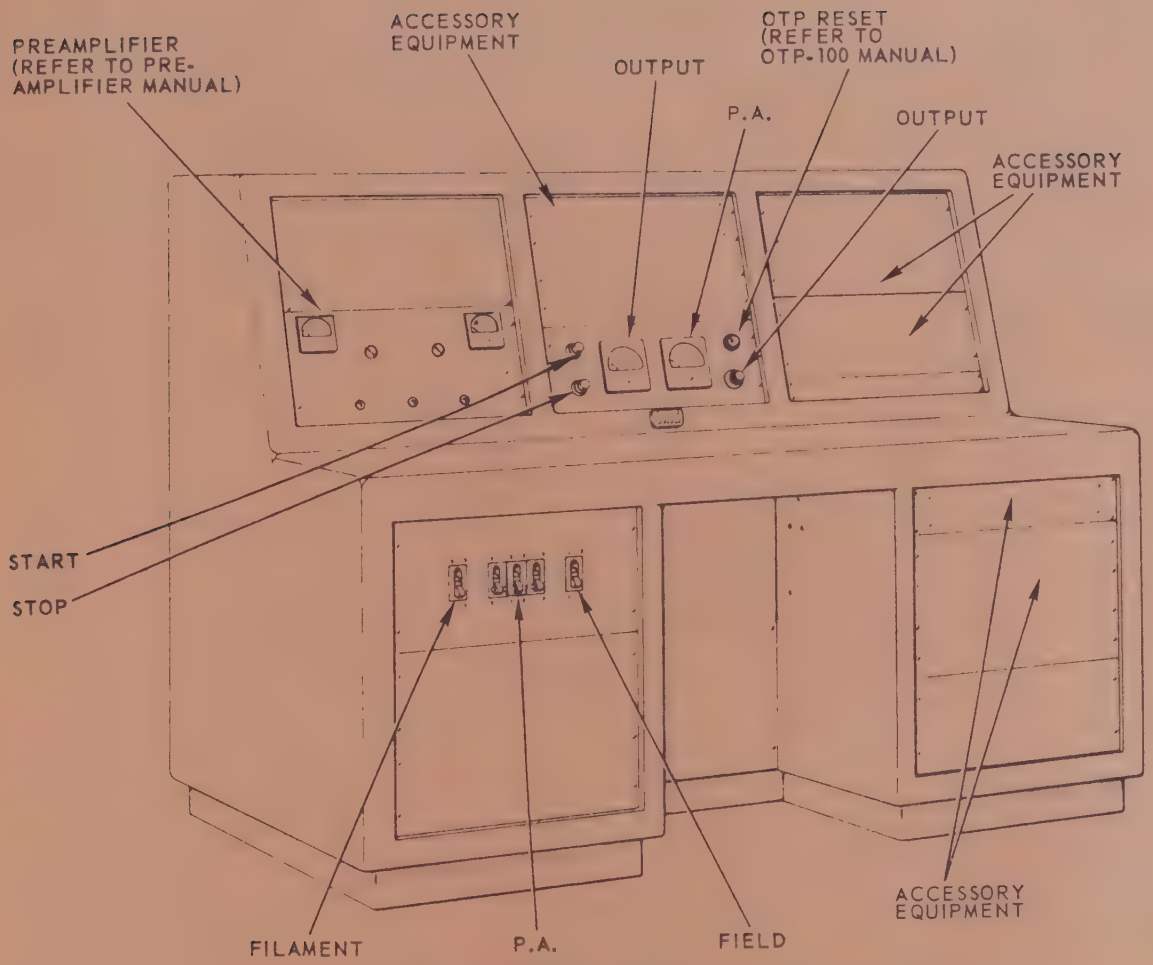

Fig. 2-2 Model CP-5/6, Front Panel Controls

b. To place the CP-5/6 into operation, the following procedure must be followed:

(1). Close all cubicle doors.

(2). Turn the OUTPUT control (3R1) full counterclockwise.

(3). Close the external 480 vac circuit breaker.

(4). Close the FILAMENT, P.A. and FIELD circuit breakers.

NOTE

INTERNAL CONSOLE AND SHAKER BLOWERS WILL START.

(5). Observe the FIELD and DEGAUSS ammeters (field supply).

NOTE

PROPER READINGS ARE GIVEN IN THE APPROPRIATE FIELD SUPPLY MANUAL. IF NECESSARY, SET FIELD AND DEGAUSS ADJUSTMENTS TO OBTAIN PROPER READINGS.

(6). To start the amplifier, press the green START pushbutton indicator. The green START indicator will go out, and the red STOP indicator will come on.

NOTE

OUTPUT CONTROL MUST BE FULLY COUNTERCLOCKWISE TO START THE POWER AMPLIFIER.

(7). Observe the P.A. kilovoltmeter. Proper reading is approximately 5 to 6 kilovolts.

(8). Slightly advance the OUTPUT control clockwise until standing current appears (step start). Set BIAS 1 and BIAS 2 adjustments to obtain a standing current of 0.3 ampere, as shown on P.A. 1 and P.A. 2 ammeters.

(9). Drive can now be applied to amplifier by advancing the OUTPUT control clockwise; P.A. 1 and P.A. 2 ammeter readings will increase, on preamplifier chassis. The OUTPUT ammeter will now read.

CAUTION

DO NOT EXCEED MAXIMUM SHAKER RATING. REFER TO SHAKER MANUAL.

(10). To turn off the amplifier, rotate the OUTPUT control fully counterclockwise, then push the lighted STOP pushbutton. Open the FILAMENT, P.A. and FIELD circuit breakers. Open the external circuit breaker.

TABLE 2-1 FRONT PANEL CONTROLS, INDICATORS, AND METERS (see figure 2-2)

PANEL MARKING	DESIGNATION	DESCRIPTION & FUNCTION
START	3IS1	Pushbutton indicator: applies high voltage to the P.A. tubes (3V1 and 3V2).
STOP	3IS2	Pushbutton indicator: used to break the contact to the high voltage contactor, thereby stopping the amplifier. This indicator will light when the START pushbutton is pressed.
P.A.	3M2	Kilovoltmeter: indicates the power amplifier high voltage.
OUTPUT	3M4	Ammeter: used to meter the output current.
FILAMENT	3S2	Circuit breaker: controls the application of power to the amplifier filaments and auxiliary circuits and provides line protection in the event of an overload.
P.A.	3S3	Circuit breaker: controls the application of power to the high voltage power supply and provides line protection in the event of an overload.
FIELD	3S4	Circuit breaker: controls the application of power to the amplifier field circuit and provides line protection in the event of an overload.
OUTPUT	3R1	Potentiometer: controls the level of signal fed to the power amplifier.

SECTION 3
PRINCIPLES OF OPERATION

3-1. INTRODUCTION

The Model CP-5/6 Power Amplifier is an audio amplifier capable of supplying a power output of 5 KVA. An input signal of 1.0 volt rms, supplied to the preamplifier, provides the required drive for full power output. The preamplifier output supplies a push-pull power amplifier consisting of two 3X3000F1 tubes operating in Class AB_1.

3-2. POWER AMPLIFIER CIRCUIT DESCRIPTION (refer to drawing 5280)

a. Door interlocks 3S5, 3S6 and 3S7 interrupt all input power to the amplifier, 120 vac and 480 vac inclusive. With all doors closed, external circuit breaker and FILAMENT circuit breaker (3S2) closed, power is applied to the 120 vac outlet strip which supplies power to the auxiliary equipment.

b. From terminal board 3TB3, power is applied to the preamplifier chassis and the shaker blower. When blower 3B1 attains maximum velocity, air flow switch 3S11 closes, energizing relay 3K1. 480 vac power is applied to the field supply, and 120 volts ac power is supplied to time delay relay 3K2. When the preset time delay has elapsed, normally open relay 3K2 closes, applying power to the remainder of the control circuit. The START pushbutton indicator (3IS1) will now light, indicating that the time delay has been completed. Gain switch 3S12 is mechanically coupled to the OUTPUT control. When the OUTPUT control is at zero, the switch will be in a closed position. When the control is not fully counterclockwise, power cannot be applied to the power amplifier control circuit.

c. By pressing 3IS1, power is applied to high voltage contactor 3K3 and STOP indicator 3IS2. Power to the high voltage supply is applied when the normally open 480 vac contacts close. The amplifier is stopped by pressing lighted STOP indicator 3IS2. This removes power from high voltage contactor 3K3, and 480 vac from the high voltage supply.

d. Power amplifier 3V1 and 3V2 operates in Class AB_1 push-pull. Bias for the stage is obtained from a separate bias supply. This supply divides the voltage to give proper amplifier bias.

e. Amplifier output current is monitored by OUTPUT ammeter 3M4. Thermocouple 3TC1 provides true rms output current monitoring.

f. Power amplifier filaments are powered from separate 480 vac filament transformers 3T3 and 3T4. Output transformer 3T6 transforms the power amplifier output to the required impedance and voltage level for driving the shaker.

g. To improve frequency response and reduce distortion, negative feedback from the secondary of the output transformer is applied to the first stage of the preamplifier. The output from the signal source is applied to OUTPUT control 3R1 and then coupled directly to the preamplifier input.

3-3. SAFETY FEATURES

In addition to the many interlocks provided for equipment and personnel protection, automatic grounding switches are installed in the cubicles for the purpose of discharging all high voltage points appearing in the cubicle whenever the doors are opened. The grounding switch is especially designed for Ling equipment, and operates by a heavy, positive spring action upon opening of the cubicle doors.

3-4. COOLING

The P.A. tubes of the Model CP-5/6 Power Amplifier are air cooled by a 480 vac three phase blower. The blower is interlocked with an airflow switch to prevent amplifier operation until airflow is adequate.

SECTION 4
MAINTENANCE

WARNING

LETHAL VOLTAGES EXIST IN THE MODEL CP-5/6 AMPLIFIER. NEVER ATTEMPT WORK INSIDE THE CABINET WITH POWER ON. ALWAYS USE A GROUNDING LEAD TO TOUCH ALL HIGH VOLTAGE POINTS BEFORE ENTERING. IF A SPECIAL TEST OR CHECK REQUIRES THE PLACEMENT OF METERS, TEST EQUIPMENT, ETC., INSIDE THE CABINET, ARRANGE THESE TO BE VISIBLE FROM THE OUTSIDE. DO NOT JUMPER INTERLOCKS TO WORK INSIDE THE CABINETS WITH POWER ON.

4-1. ANALYSIS

a. The first step in servicing a defective Model CP-5/6 Power Amplifier is to determine the major unit causing the trouble. An improperly mounted specimen (on the shaker table) may make the amplifier or associated equipment appear to have a low output. Rattles or loose connections (in the shaker) can cause severe distortion in the acceleration waveform. This could make the trouble appear to be in some other unit. Troubles may exist in the control console, signal source, shaker, accelerometers or specimen.

b. When the trouble has been traced to a major unit, it is then necessary to localize the fault. Some faults such as burned out resistors, arcing and shorted transformers can be located by sight, smell, or hearing.

c. The following tests are arranged to simplify and reduce unnecessary work and aid in tracing a trouble to a specific circuit or component:

(1). Visual inspection may disclose the trouble or determine the circuit in which the trouble exists.

(2). Trouble shooting symptoms are listed in paragraph 4-3 to aid in determining the defective part.

(3). Intermittent conditions should not be overlooked when conducting these tests. This type of trouble may often be located by tapping or jarring the equipment.

4-2. INTERLOCK SYSTEM

a. It is important that the three phase blower used for P.A. cooling turn in the correct direction. Inadvertent change in phase could cause the blower to turn in the opposite direction. This would cause the airflow switch (3S11) to remain open, preventing application of power to the filaments. To correct this condition, reverse any two of the three phase leads at the line breaker input.

b. The simplest interlock problems encountered are with the door interlocks. These problems most often arise from maladjustment of doors and/or interlocks.

4-3. TROUBLE SHOOTING

a. The following trouble shooting table is meant to be a basic guide to the possible root of troubles encountered. The greatest asset in trouble shooting the CP-5/6 is to remember that regardless of size, it is an audio amplifier.

TABLE 4-1 TROUBLE SHOOTING (refer to figure 4-1)

TROUBLE	LOCATION	CAUSE AND/OR REMEDY
Excessive noise in acceleration waveform (sine wave)	Extemal	Check the mounting of the specimen.
		Check the shaker for rattles and loose connections.
	Intemal	Check the signal source at the control console.
Excessive Hum	Extemal	Check for open ground or other defects in accelerometer wiring.
Excessive Hum	Intemal	Check the signal source.
		Check hum balance adjustments on the preamplifier.
		Check for defective P.A. tubes (3V1 and 3V2).
		Check for heater to cathode shorts in the input tubes of the preamplifier.
Excessive distortion	Extemal	Check the mounting of the specimen.
		Check the shaker for rattles and loose connections.
		Check for servo malfunction.
		Check the signal source at the control console.
		Check the shaker for bad bearings or blower malfunction.
		NOTE: Resonance of the shaker or specimen (or both) may magnify normal distortion many times.
	Internal	Check the P.A. Bias voltage.
		Check tubes 3V1 and 3V2.
Repeated circuit breaker tripping	Extemal	Check for short in the shaker armature.
		Check the OTP-100 for defects.
	Internal	Check for shorts in the P.A. tubes 3V1 and 3V2.
		Check for gassy preamplifier tubes.
		Check for shorts in the P.A. output transformer (3T6).
Amplifier does not respond to turn on procedure.	Extemal	Check 480 volt external power.

TABLE 4-1 TROUBLE SHOOTING (cont.)

TROUBLE	LOCATION	CAUSE AND/OR REMEDY
No Output	External	Check the signal source for defective components.
		Check the input to the preamplifier.
	Internal	Check for defective tubes in preamplifier.
		Check for defective components in the preamplifier.
FILAMENT breaker failure	Internal	Check each leg of the FILAMENT breaker (3S2) for excessive current. If excessive current is present, check filament transformers 3T3 and 3T4, P.A. blower (3B1), and step down transformer 3T2.
P.A. Breaker failure	Internal	Check tubes 3V1 and 3V2 for shorts.
		Check plate transformer 3T5.
Parasitics	Internal	Check for damaged parasitic suppressors 3R4 and 3R5.
		Check for ground loops in instrumentation.
Excessive plate current when new 3X3000F1 tube is installed (not enough bias)	Internal	Refer to preamplifier manual.
Insufficient plate current when new 3X3000F1 tube is installed (too much bias)	Internal	Refer to preamplifier manual.

b. Hum, Noise, and Distortion Testing

(1). The following procedures determine if excessive hum, noise, or distortion (observed on the accelerometer waveform) is externally caused or if it is in the amplifier:

(a). Disconnect the amplifier input signal leads. Short the terminals together, using a short length of bare wire. Operate the amplifier with the shaker connected normally. If hum, noise, or distortion disappears the trouble is in the signal source.

(b). If the hum, noise or distortion persists, observe the voltage waveform at the amplifier output terminals. This will isolate the component at fault (refer to the appropriate manual).

c. Preamplifier Circuit Tests.

(1). If there is distortion or no output from the preamplifier, check all tubes. If the trouble remains, check for defective component or components (refer to preamplifier manual).

d. Field Supply.

(1). Refer to the appropriate Field Supply manual.

4-4. TEST EQUIPMENT

a. The test equipment required for trouble shooting the CP-5/6 is listed below:

(1). Audio oscillator.

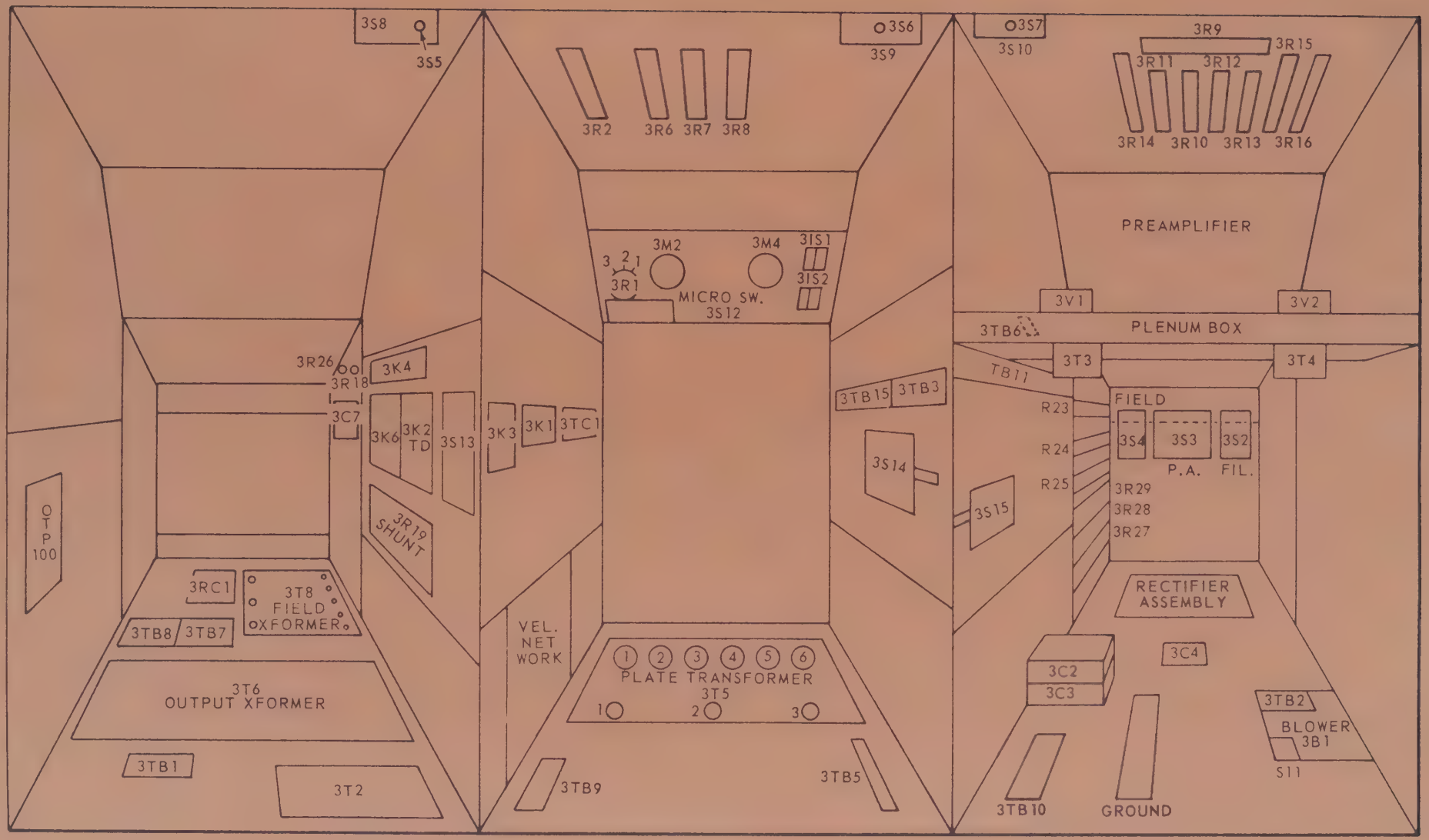

Fig. 4-1 Model CP-5/6, Component Location Chart

(2). Distortion analyzer.

(3). Oscilloscope.

(4). AC VTVM

4-5. POWER AMPLIFIER BALANCE

a. Unequal plate current to the power amplifier tubes (3V1 and 3V2) indicates an unbalanced condition. This is commonly the result of one tube or tube section aging faster than the other. Balance can be restored over a limited range by the use of a distortion analyzer and the AMPLIFIER BALANCE potentiometer located on the front panel of the preamplifier chassis. The procedure is as follows:

(1). Operate the amplifier at full load with a sine wave signal at the mid range frequencies (50-1000 cps). Note the amount of unbalance.

(2). Adjust the AMPLIFIER BALANCE control (located on the preamplifier) until balance is obtained.

4-6. TUBE SERVICING

a. Tube Removal

(1). To remove tubes 3V1 and 3V2, the procedure is as follows:

(a). Open the external breaker.

(b). Remove the cover at the rear of the power amplifier plenum chamber.

(c). Remove the filament leads from the tubes.

(d). Loosen the set screws securing the tubes to the mounting ring.

(e). Lift the tube out.

b. Tube Installation

(1). Tube installation is the reverse of the removal procedure.

c. Tube Break-in

(1). Allow 20 to 30 minutes additional filament warmup time.

4-7. CLEANING

a. High voltage attracts dust, an accumulation of which can cause flashovers and shut downs. Clean the cabinets at least once every two months using a tank type vacuum cleaner.

b. Air filters should be replaced when dirt becomes noticeable. The period of replacement depends on use. Filters may need replacing each month or every few weeks in very dusty locations. An excessive accumulation of dust inside the cubicles is a reliable indication that filters should be replaced.

c. Clean interlock and unsealed relay contacts only when absolutely necessary. Use only smooth burnishing tools to clean contacts.

4-8. OTHER DIFFICULTY

In the event of troubles or problems not covered by this manual, contact the factory, giving the serial number and Ling number, conditions of use, and a full description of the problem. Ling field service personnel are available for consultation on special problems concerning the utilization or application of Ling equipment.

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CT-3/A	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
		SILK SCREEN DRAWINGS							
	3855-2	Top Plate							
	4576 —	Circuit Breaker Panel							
	4286 —	Control Panel							

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
2			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

ENG

ENGINEERING PARTS LIST

REQ. NO.

MODEL	☒ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
[illegible]							

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
		Freq. Stiffen. Chassis	[illegible]	[illegible]	1	1			
	4251-[illegible]	Servo Voltmeter Group Assembly			1	1			
		Overtravel Protection Chassis	[illegible]	Model [illegible]	1	1			

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

LING

ENGINEERING PARTS LIST

REQ. NO.

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[illegible]							

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	[illegible]2-C	Console Assy. 3 Bay			1	1				
[illegible]	[illegible] -	[illegible]			[illegible]	2				
[illegible]	[illegible]-1 -	[illegible]			1	1				
[illegible]	2980 -	Spacer Grounding			[illegible]	1				
	[illegible]-E	Panel Resistor Mounting L.H.			1					
	[illegible]-D	[illegible] Mounting [illegible]			1					
	[illegible]-5	[illegible] Mounting L.H.			1					
	[illegible]-F	Panel Relay Mounting R.H.			[illegible]	1				
		[illegible]			1	1				
		[illegible]			1	1				
		End Fitting, A.C. [illegible]			1	1				

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LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A O

LING

ENGINEERING PARTS LIST

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MODEL	☒ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
[illegible]							

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	[illegible]	[illegible]			[illegible]	[illegible]				
	[illegible]	Box Plenum								
	[illegible]	[illegible]			[illegible]	[illegible]				
	3828-1-A	[illegible]			[illegible]	[illegible]				
	[illegible]	[illegible]			[illegible]	[illegible]				
	[illegible]	Ty Plate, Plenum (Blk Screen [illegible]			[illegible]	[illegible]				
	[illegible]	[illegible]			[illegible]	[illegible]				
	[illegible]	[illegible]			[illegible]	[illegible]				
	4815	[illegible]	[illegible]		[illegible]	[illegible]				
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LING FORM FS-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A O

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO	QUANTITY	PURCHASE	RELEASE	SCHEDULE

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY ISSUED

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L--NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-3[illegible]	☒ BASIC ☐ SUPPLEMENT						

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[illegible]		[illegible]			[illegible]	[illegible]				
[illegible]		Resistor [illegible]			[illegible]	[illegible]				
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
	[illegible]	[illegible]								
[illegible]	[illegible]	[illegible]			1	1				
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[illegible]		Resistor [illegible]								

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
2			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A C

LING — REQUISITION — REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CD-5/6	☒ BASIC ☐ SUPPLEMENT						

REF SYMBOL DESIGNATION	DWG-PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY ISSUED
	3793 C	Brkt., Fan Mtg. (see dwg. #30767)			1	1			
	1234	Stop Shorting SW			1	1			
		Cord AC	[illegible]	2132 or equivalent	1	1			
		Dust Filter 1 x 17 x 23	LA		1	2			
		A.C. Elec Flex	[illegible]	[illegible]	[illegible]	[illegible]			
	40239-B	Protection Guard, Rear Door (see dwg #40270)			1	1			
	2941-A	Washer (see Dwg. #40270)			4	4			
		Flex Bolt Mtg. (3B1 Blower)	[illegible]	1-4624-19	4	4			
	1025-C	Lug			24	24			
	20676	Strip Mtg. Parasitic Resistor			2	2			

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

LING

ENGINEERING PARTS LIST

REQ NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CT 9/6	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
	[illegible]	[illegible]			1	1			
		[illegible]		[illegible]	1	1			
		[illegible]	[illegible]	[illegible]	1	1			
		[illegible]	"	[illegible]	[illegible]	[illegible]			
		Spacer - Hex., Threaded ¼" x 1" Lg, 8-32 Thd. Brass, Cad.Plated			--	4			

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
1			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

LING ELECTRONICS — ENGINEERING PARTS LIST — REQ. NO.

MODEL	☒ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
[illegible]							

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
	[illegible]-P	Panel, [illegible] (Silk Screen per [illegible])			1	1			
	[illegible]-P	[illegible] Circuit [illegible] (Silk Screen per Dwg. [illegible])			1	1			
	[illegible]-1	Panel, Blank 10½ x 19			1	1			
	[illegible]-4	Panel, Blank 5 1/4 x 19			2	2			
	[illegible]-5	Panel, Blank 7 1/4 x 19			1	1			
	[illegible]-6	Panel, Blank 3 1/2 x 19			3	3			
	[illegible]-12	Panel, Blank 12 3/4 x 19			1	1			
	ES-100-8	Panel, Blank 8-3/4 x 19			1	1			
	ES-100-10	Panel, Blank 10-1/2 x 19			2	2			
	20288	Panel, Filler Nameplate			1	1			

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
10			

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-3[illegible]	[X] BASIC [ ] SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED	Q SHO
3TB1		Barrier Type Terminal Strip	[illegible]	[illegible]	1	1				
3TB2		Barrier Type Terminal Strip	[illegible]	[illegible]	1	2				
3TB3		Barrier Type Terminal Strip	[illegible]	[illegible]	1	1				
3TB4		Barrier Type Terminal Strip	[illegible]	[illegible]	1	--				
3TB5		Barrier Type Terminal Strip	[illegible]	[illegible]	1	1				
3TB6		Barrier Type Terminal Strip	[illegible]	[illegible]	1	--				
3TB7		Barrier Type Terminal Strip	[illegible]	[illegible]-Y	1	1				
3TB7		Barrier Type Terminal Strip	[illegible]	[illegible]	1	1				
3TB8		Barrier Type Terminal Strip	[illegible]	[illegible]	1	1				
3TB9		Barrier Type Terminal Strip	[illegible]	JD-[illegible]	1	1				
3TB10		Barrier Type Terminal Strip	[illegible]	[illegible]	1	--				

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
//			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE- Purchase = P Fabrication = F Assembly = A Ou

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CF-5/6	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED	Q SH
3TB11		Barrier Type Terminal Strip			1	1				
3TB11		Barrier Type Terminal Strip			1	1				
3TB12		Barrier Type Terminal Strip			1	1				
3TB13		Barrier Type Terminal Strip			1	1				
		3TB1 Marker, Barrier Strip			1	1				
		3TB3-1 thru 8 Marker, Barrier Strip			1	1				
		3TB4-1 thru 7 Marker, Barrier Strip			1	1				
		3TB4-1 thru 2 Marker, Barrier Strip			1	1				

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
12			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A Out

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
[illegible]							

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY ISSUED	QTY SH
		3TB5-1 thru 5 Marker, Barrier Strip	CJ	MSX-7-[illegible]	1	1				
		3TB5-6 thru 13 Marker, Barrier Strip	CJ	MSX-[illegible]	1	[illegible]				
		3TB7-1 thru 4 Marker, Barrier Strip	CJ	MSX-[illegible]	1	1				
		3TB8-1 thru 2 Marker, Barrier Strip	CJ	MSX-[illegible]	1	1				
		3TB9-1 thru 10 Marker, Barrier Strip	CJ	MSX-[illegible]	1	1				
		3TB10-1 thru 6 Marker, Barrier Strip	CJ	MSX-[illegible]	1	[illegible]				
		3TB11-1 thru 12 Marker, Barrier Strip	CJ	MSX-14-142	1	1				
		3TB11-13 thru 31 Marker, Barrier Strip	CJ	MSX-[illegible]	1	1				
		3TB12-1 thru 20 Marker, Barrier Strip	CJ	MSX-[illegible]	1	1				

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
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LING FORM ES-100 ALTERNATE HEADINGS ①PURCHASE ORDER ②ESTIMATED DELIVERY CODE: Purchase = P Fabrication = F Assembly = A Ou

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE

REF. SYMBOL DESIGNATION	SWG. PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
					1	-			
					1	-			

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
54			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-616							

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY ISSUED	
B1	80-1067	Blower and Motor			1	1				
B1C	80153-0004B	Blower Assembly (Squirrel Type with Blade	B LB	CP734 LB	1 1	1 1				
C										
C2		Capacitor, H.V. 5μfd, 6KV	SA	Y1611	1					
C3		Capacitor, H.V. 3μfd, 6KV	SA	Y1611	1	-				
C4		Capacitor, H.V. Oscillator Shield - 500 μμf Type 2[illegible]	SA	[illegible]	1	-				
C7		Capacitor, Field (See Appropriate Field Supply Parts List)								

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
23			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY CODE Purchase = P Fabrication = F Assembly = A Ou

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO	QUANTITY	PURCHASE	RELEASE	SCHEDULE

REF SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
		Push Button, Start CONSISTING OF:							
	8186-0004	Illuminated push 110V,							
		Push Button, CONSISTING OF:							
	8186-0004	Illuminated Push Transformer Type							

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY CODE: Purchase = P Fabrication = F Assembly = A

ENGINEERING PARTS LIST

REQ. NO.

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
	☐ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG. PART NO.	DESCRIPTION	MFG.	MFG. PART NO	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED	

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY CODE: Purchase = P Fabrication = F Assembly = A

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-5/6	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ	QTY ISSUED	
3M2	82376-0007	Meter, P.A. Plate Volts 1MA (0-10KVDC)			1	1				
3M4	82356-0005	Meter, Output Amps (0-5A) mod with 50A External Thermocouple	GE	KFO-91	1	1				
3M5		Meter, [illegible] (See Appropriate Field Supply Parts List)	GE							
3M6		Meter, [illegible] (See Appropriate Field Supply Parts List)	GE							

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
LF			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A Out

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
P-314	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED	Q
3R1		Resistor, Potentiometer, Master Gain	O	P-314	1	1				
3R1-1		25K, 2W								
		Resistor, Bias								
		10K 115W	WL		1	1				
3R6		Resistor, Parasitic Supp.	O	Model P-300	1	1				
3R5		Resistor, Parasitic Supp.	O	Model P-300	1	-				
3R6		Resistor, Limiting			1	1				
3R7		Resistor, Limiting			1	-				
3R8		Resistor, Limiting			1	-				
3R9		Resistor, Decoupling			1	1				
3R10		Resistor, 35T Plate Load			1	-				
		50K, 50W WL #5½B 50,000 type 314 Ferrule								
3R11		Resistor, 35T Plate Load			1	-				
		50K, 50W WL #5½B 50,000 type 314 Ferrule								
3R12		Resistor, 35T Plate Load			1	-				
		50K, 50W WL #5½B 50,000 type 314 Ferrule								

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
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LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-516	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG	MFG. PART NO	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED	QTY SHO
3R13		Resistor, 35T Plate Load 30K, 50W WL #3½B 50,000 type 314 Ferrule			1	-				
3R14		Resistor, Bleeder 100K, 115w WL #6½D 100,000 type 314 Ferrule			1	1				
3R15		Resistor, Bleeder 100K, 115W WL #6½D 100,000 type 314 Ferrule			1	-				
3R16		Resistor, Bleeder 100K, 115W WL #6½D 100,000 type 314 Ferrule			1	-				
3R17	30191-3	Resistor, Meter Multiplier 330K, 2W, 5%			10	10				
3R18		Resistor, Field (See Appropriate Field Supply Parts List)								
3R19		Resistor, Meter Shunt, Field (See Appropriate Field Supply Parts List)								
3R20		Resistor, Rheostat, Degauss (See Appropriate Field Supply Parts List)								
3R21		Resistor, Feedback 68K, 1W			1	1				
3R23		Resistor, Current Limiting (See Appropriate Field Supply Parts List)								
3R24		Resistor, Current Limiting (See Appropriate Field Supply Parts List)								
3R25		Resistor, Current Limiting (See Appropriate Field Supply Parts List)								
3R26		Resistor, Suppression (See Appropriate Field Supply Parts List)								

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
21			

[illegible] INSTALLATION PARTS LIST

REQ. NO.

MODEL	☐ BASIC ☐ SUPPLEMENT	SHOP ORDER	L--NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
[illegible]							

REF. SYMBOL DESIGNATION	DWG/PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
[illegible]		[illegible]							
[illegible]		[illegible]							
[illegible]		[illegible]							

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
[illegible]			

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY CODE: Purchase = P Fabrication = F Assembly = A

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-5/5	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY ISSUED	Q SH
352		Circuit Breaker, Filament	[illegible]	[illegible]	1	1				
353		Circuit Breaker, P.A. Type [illegible]	[illegible]	[illegible]	1	1				
354		Circuit Breaker, Field (See Appropriate Field Supply Parts List)	[illegible]							
350	82285-0005	Switch, Door Interlock	MS	1AG1	1	3				
350	82285-0005	Switch, Door Interlock	MS	1AG1	1	-				
350	82285-0005	Switch, Door Interlock	MS	1AG1	1	-				
351	82285-0039	Switch, Airflow [illegible]	R	Type 4000	1	1				

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY
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LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE. Purchase = P Fabrication = F Assembly = A

LFNG ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO.

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
CP-516	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED	Q SH
S812 20453-4		Switch, Gain, Roller Plunger	MS	[illegible]	1	1				
S813	3178	Switch, Shorting			1	1				
S814	3178	Switch, Shorting			1	-				
S815	3178	Switch, Shorting			1	-				

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A Ou

LING ELECTRONICS

ENGINEERING PARTS LIST

REQ. NO

MODEL	BASIC / SUPPLEMENT	SHOP ORDER	L-NO.	QUANTITY	PURCHASE	RELEASE	SCHEDULE
SP-5/6	☒ BASIC ☐ SUPPLEMENT						

REF. SYMBOL DESIGNATION	DWG PART NO.	DESCRIPTION	MFG.	MFG. PART NO.	QTY / ASSY	QTY / UNIT	CODE	TOTAL REQ.	QTY. ISSUED
T1		Transformer, Auto (Specified by Customer Per P.O.N.)							
T2	PT-369	Transformer, Stepdown PT-369 480VAC to 120VAC, 1.5KVA			1	1	-		
T3	PT-365	Transformer, Filament PT-365 480VAC to 7.5VAC, 51A			1	2	-		
T4	PT-365	Transformer, Filament PT-365 480VAC to 7.5VAC, 51A			1	-	-		
T5	PT-369	Transformer, Plate, PT-369 10KVA			1	1	-		
T6	PT-369	Transformer, Output 185VRMS 27A 5KVA A2-251			1	1	-		
T7		Transformer, Isolation (See Recommended Field Supply Parts List)							
T8		Transformer, Trim (See Recommended Field Supply Parts List)							
TC1		Thermocouple 50 Amp Must Come with Output Meter	L		-	1	-		
V1	82130-0008	Tube	EI	3A3000F1	1	2			
V2	82130-0008	Tube	EI	3A3000F1	1	-	-		

DEPARTMENT	ISSUED BY	ISSUE DATE	RECEIVED BY

LING FORM ES-100 ALTERNATE HEADINGS (1) PURCHASE ORDER (2) ESTIMATED DELIVERY

CODE: Purchase = P Fabrication = F Assembly = A

ENGINEERING PARTS LIST

MODEL OR ASSY.	SERIAL NO.	SHOP ORDER	PON	QTY.	ACCOUNT NO.	McDAY	DATE
CP 5/6	238	33577	42521				

REF	ITM	*R.S.	SYMBOL DESIG.	STOCK/DWG NUMBER	DESCRIPTION	MFG CODE	MANUFACTURER PART NUMBER	QTY. ASSY	QTY. UNIT	COD	KARDEX	PURCHASE ORDER
				5280-238	Schematic Amp.							
				31745-238	Component Layout							

*R.S. - RECOMMENDED AS CUSTOMER SPARES

DEPARTMENT	ISSUED BY	ISSUE DATE

ENGINEERING PARTS LIST

MANUAL

REQUISITION NO.

NUMBER OF ASSY							
CP 5/6							

REV.	ITEM	*R.S.	SYMBOL DESIG.	STOCK/DWG NUMBER	DESCRIPTION	MFG CODE	MANUFACTURER PART NUMBER	QTY. ASSY.	QTY. UNIT	CODE	KARDEX	PURCHASE ORDER
					DELETE FOLLOWING ITEMS FROM CP 5/6 PARTS LIST							
			Pg. 10	40578	Front Panel Breaker			1	1			
			Pg. 11 3TB5	80112-0067	Barrier Type Terminal Strip	CJ	5-151	1	1			
			Pg. 11 3TB5	80112-0012	Barrier Type Terminal Strip	CJ	8-142	1	1			
			Pg. 13		Marker Strip	CJ	MSX-5-151	1	1			
			Pg. 13	80113-0005	Marker Strip	CJ	MSX-8-142	1	1			
			Pg. 19 3M4	82356-0005	Meter Output Current (0-50A) w/ext thermo			1	1			
			Pg. 21 3R21		Resistor Feedback 180K 1W			1	1			
			Pg. 25 3T6	AT-253	Transformer Output			1	1			
			Pg. 25 3TC1		Thermocouple 50 A (Part of 3M4)			-	-			
				20288	Filler			1	1			

*R.S. - RECOMMENDED AS CUSTOMER SPARES

DEPARTMENT	ISSUED BY	ISSUE DATE

LING ELECTRONICS A division of LING-TEMCO-VOUGHT, INC

ENGINEERING PARTS LIST

DATE 3-2-64 PAGE 3 MANUAL

MODEL OR ASSY. CP 5/6 | SERIAL NO. | SHOP ORDER | PON | QTY. | ACCOUNT NO. | M-DAY | DATE

*R.S.	STOCK/DWG NUMBER	DESCRIPTION	MFG CODE	MANUFACTURER PART NUMBER	QTY. ASSY.	QTY. UNIT	CODE	KARDEX	PURCHASE ORDER
		ADD FOLLOWING ITEMS							
	3TB42	Barrier Type Terminal Strip	CJ	20-142	1	1			
		Marker Strip for 3TB42	CJ	MSX-20-142	1	1			
	3TB40	31589 Terminal Board			1	1			
	3M4	82357-0007 Meter Output Current (0-500A) w/5A Ext. Thermo.			1	1			
	3TC1	Thermocouple 5A (Part of 3M4)			-	-			
	3T6	AT-617 Transformer Output			1	1			
	3T9	82307-0002 Current Transformer 500/5			1	1			
		Brkt Current XMFR Mtg.	WE	447C337G03	1 set	1 set			
		Velocity Network Consisting of 2 Items		VN 330					
		Coil & Fin Assy			1	1			
		Vel.Net. Assy			1	1			

*R.S. - RECOMMENDED AS CUSTOMER SPARES

DEPARTMENT | ISSUED BY | ISSUE DATE

LING ELECTRONICS A division of LING-TEMCO-VOUGHT INC

ENGINEERING PARTS LIST

DATE [illegible] PAGE 4 PAGES [illegible]

REV. — CONT'D ON 5 REQUISITION NO.

MODEL OR ASSY.	SERIAL NO.	SHOP ORDER	PON	QTY.	ACCOUNT NO.	M-DATE	PAT
CP 5/6							

A	N	*R.S.	ITEM	STOCK/DWG NUMBER	DESCRIPTION	MFR CODE	MANUFACTURER PART NUMBER	QTY. ASSY.	QTY. UNIT	CODE	KARDEX	PURCHASE ORDER
				82460-0020	Standoff Term Board Mtg. (31589)	PAINE CO	227-9	4	4			
				41451	Panel Ckt. Breaker Mtg.			1	1			
				41452	Silk Screen Panel 41451			-	-			
				82470-0006	Lug for 3TB40			7	7			
			3R21	82231-0333J	Resistor Feedback 33K 1W 5%			1	1			
				ES100-8	Panel Blank 8 3/4 x 19			1	1			
				ES100-10	Panel Blank 10½ x 19			1	1			
				31045	Filler			1	1			
				31135	Brkt Vel. Net. Box Mtg.			1	1			
			3TB17		Barrier Type Term. Strip (Ref ECO #2617A ECR #4989)	CJ	20-142	1	1			
					Marker Strip for 3TB17	CJ	MSX-20-142	1	1			

*R.S. - RECOMMENDED AS CUSTOMER SPARES

DEPARTMENT	ISSUED BY	ISSUE DATE

LING ELECTRONICS A Subsidiary of LING-TEMCO-VOUGHT, INC.

ENGINEERING PARTS LIST

DATE [illegible] PAGE 5 MANUAL

REV. CONT'D ON REQUISITION NO.

MODEL OR ASSY.	SERIAL NO.	SHOP ORDER	PCN	QTY.	ACCOUNT NO.	[illegible]	DATE
CP 5/6							

REV.	ITEM	[illegible]	[illegible]	STOCK/DWG NUMBER	DESCRIPTION	MFG CODE	MANUFACTURER PART NUMBER	QTY. ASSY.	QTY. UNIT	CODE	KARDEX	PURCHASE ORDER
				SCO-2	Servo Cycling Osc.	B&K		1	1			
				PLA-100	Power Supply Acc. Amp.			1	1			
					Accelerometer w/Standard Cable	END	2221	1	1			
					Acc. Amp.	END	2614B	1	1			
				31596	STEARING BD			1	1			
				21034	STRAP			3	3			

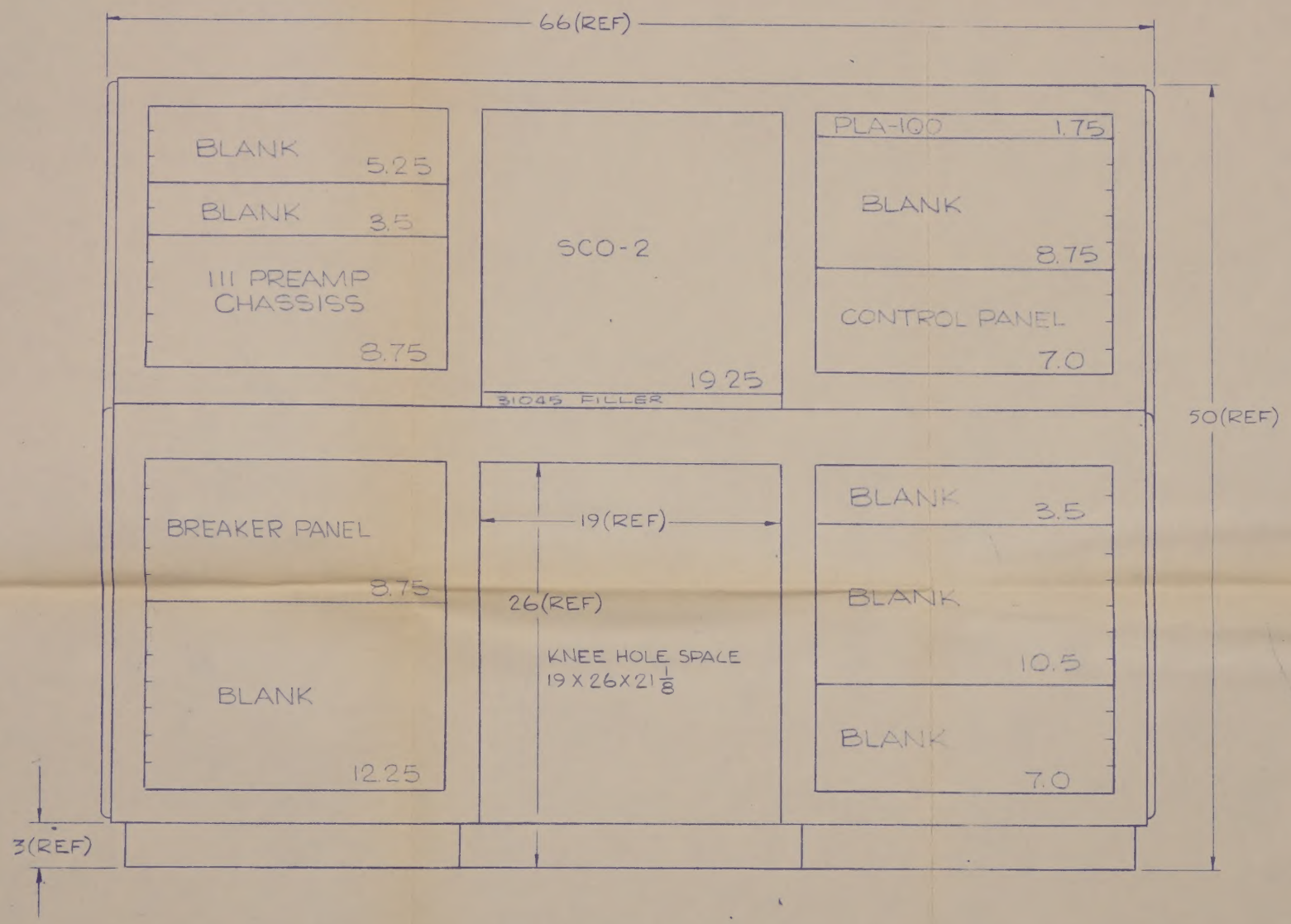
*R.C. - RECOMMENDED AS CUSTOMER SPARES

DEPARTMENT	ISSUED BY	ISSUE DATE

CODE TO MANUFACTURERS

AA	AIR ASSOCIATES
AB	ALLEN BRADLEY
AC	ASTRON CORPORATION
ACDC	ACDC ELECTRONICS
AD	ADVANCE RELAY
AD-YU	AD-YU LABS
ADEL	ADEL
ADMS	ADAMS & WESTLAKE
AH & H	ARROW-HART & HEGEMAN
AI	AIRCRAFT
AIRM	AIR MARINE PRODUCTS
ALB	ALBION
ALL	ALLIS CHAMBERS
AMC	AMSCO
AME	AMPERITE CO.
AMM	AMMON INSTRUMENTS INC.
AMP	AMPHENOL
AMPX	AMPEX
AP	AIR PAX
APH	ALPHA
API	AMERICAN PAMCOR INC.
AQ	AEROQUIP
AR	AEROVOX
ARCO	ARCO ELECTRONICS
ARM	ARMSTRONG CORK CO.
AS	ASSOCIATED SPRING
ASP	ASSEMBLY PRODUCTS
ATLE	ATLEE
AUTO	AUTOMATIC ELECTRIC
BAS	BASSICK
BC	BARBAR COLMAN
BECK	BECKMAN INSTRUMENTS
BEL	BELDEN
BEN	BENDIX
BG	BOSTON GEAR
BI	BIRNBACH
BIRT	BIRTCHER
BO	BODINE
BOU	BOURNS "TRIMPOT"
BOW	BOWERS
BP	BOGEN-PRESTO
BRE	BREEZE "AERO SEAL"
BRY	BRAYANT
BUD	BUD
BUCH	BUCHANAN
BUG	BUGGIE
BUR	BURROUGHS
BUSS	BUSSMAN MFG.
B & K	BRUEL & KJAER
C	CHATHAM
CA	CARLING ELECTRIC
CAL	CALIDYNE
CALC	CALIFORNIA CHASSIS
CAN	CANNON
CCI	CONTINENTAL CARBON, INC.
CD	CORNELL DUBILIER
CH	CHICAGO STANDARD TRANS.
CHD	CROUSE HINDS
CHSH	CHASE-SHAWMUT
CI	CINEMA
CJ	CINCH-JONES
CK	CONROY & KNOWLTON
CL	CLARK CONTROLER CO.
CLAR	CLAROSTAT
CM	COMPUTER MEASUREMENTS
COR	CORNISH
CP	COMMUNICATION PROD.
CRA	CRAMER
CRAF	CRAFTSMAN
CRIT	CRITTENDEN
CRL	CENTRALAB
CRN	CRANE
CT	CHASSIS TRAK
CTS	CH. TELE SUPPLY
CU	CURTIS
CUT	CUTLER HAMMER
D & H	D & H AWNING
DA	DAYTON
DALE	DALE
DECO	DEECO
DEFT	DEECO FELT
DELR	DELRY
DI	DIALITE CORP. (DIALCO)
DICO	DIAMOND MFG. (DICO)
DM	DIAMOND METAL
DRAK	DRAKE - ATWOOD
DUC	DUCOMMON
DUM	DUMOND
DY	DYMEC
ECK	ECKTRONICS
ED	EDCLIFF INST.
EEW	ELECTRO ENG. WORKS
EF	ELECTRO FAB.
EI	EIMAC
EM	ELECTRO-MEASUREMENTS
ELCO	ELCO
ELME	ELMENCO
ELTC	ELECTRAC
EMC	EMCOR
EMEC	EMEC
EMP	EMPCO
ENDV	ENDEVCO
EP	ENGINEERING PROD.
ER	ERIE
ERA	ELECTRONIC RESEARCH ASSOC.
ERC	ELECTRA RESISTOR CORP.
ES	EAGLE SIGNAL
ESCO	ELECTOR-SWITCH CORP.
ESX	ESSEX
EVER	EVEREST
F	FENWAL
FAN	FANSTEEL
FED	FEDERATED
FED-S	FEDERAL SCREW
FEI	FEDERAL ENTERPRISE, INC.
FF	FEDERAL FASTENING
FP	FISHER-PORTER
FR	FRANZ
FU	FULLER
ITT	FEDERAL (IT & T)
G	GRAYBAR
GA	GATES
GAXY	GALAXY
GC	GENERAL CEMENT
GCON	GENERAL CONTROL
GE	GENERAL ELECTRIC
GLA	GEELAR
GL	GLOBAR
GR	GENERAL RADIO
GRHL	GRAYHILL
GRIS	GRIGSBY CO.
GU	GUDEMAN
GV	G. V. CONTROL
HAW	HARTWELL
HAYS	HAYS MFG.
HE	HEINEMANN
HEY	HEYCO
HP	HEWLETT PACKARD
HGR.	H. G. REISING
HL	HELIPOT
HOF	HOFFMAN
HOP	HOPKINS
HS	HARDWARE SPEC.
HU	HUBBEL
HY	HYCOR
HYD	HAYDON
IGNS	INGERSOL RAND
IL	ILSCO
ILG	ILG
IMP	IMPERIAL
INSU	INSULINE
IRC	INT. RESISTOR CORP.
IREC	INT. RECTIFIER CORP.
IS	INSULATION SUPPLY
ITE	ITE CIRCUIT BREAKER
J	JOHNSON
JAN	JAN HARDWARE MFG.
JE	JEFFERSON
JEN	JENSEN
K	KIERLUFF
KENR	KEINER
KH	KRON-HITE
KING	KING
KT	KOOLTRONIC
KU	KULKA
KZ	KURZ-KASCH
LA	LYNCH ASBESTOS
LAMB	LAMBDA
LAR	L. A. RESISTOR
LE	LEACH
LER	LERCO
LI	LITTLE FUSE
LING	LING ELECTRONICS DIV.
LMB	LMB
LP	LAPP
LPD	LA-DEAU PROD.
LUNK	LUNKENHEIMER
M	MILLEN
MA	MALLORY
MD	MICRODOT
ME	METTSCRAFT
MEC	MEC
MH	MINNEAPOLIS HONEYWELL
MICA	MICAMOLD
MIN	MINARIK
ML	MACHLETT
MLR.	MILLER CO.
MMN	MARMON
MN	MARION
MOD	MODULONICS
MON	MONITOR
MOSE	MOSELEY
MOSS	MOSSMAN
MRC	MARCO
MRY	MURRAY
MS	MICROSWITCH
MTRO	MOTOROLA
N	NATIONAL CO.
NC	NATIONAL WIRE & CABLE
NE	NETWORK MFG.
NEI	NATIONAL ELECTRONICS INC.
NEP	NATIONAL ELECTRICAL PROD.
NHBB	NEW HAMPSHIRE BALL BEARING
NIBCO	NORTHERN INDIANA BRASS
NL	NATIONAL LOCK
O	OHMITE
OZ	O.Z. ELECTRICAL MFG CO.
PAN	PANDUIT
PANX	PANDUX
PCA	PCA
PE	PEERLESS
PENN	PENN CONTROL
PER	PERMOID
PH	PHILLIPS CONTROL (PHILTROL)
PHIL	PHILBRICK RESEARCH
PREM.	PREMIER METAL PROD.
PRKR	PARKER ELECTRICAL INST.
PRYN	PRYNE
PTB	POTTER - BRUMFIELD
PY	PYRAMID
QE	QUALITY ELECTRIC
R	ROTRON
RAY	RAYTHEON
RBC	RUBBERCRAFT
RCA	RADIO CORP. OF AMER.
RCC	RADIO CONDENSER CO.
RDL	RADIO DEVELOPMENT LAB
RE	REPUBLIC GLASS
REN	RENBRANDT
ROB	ROBERTSHAW-FULTON CON.
ROME	ROME
RT	RATIGAN
RY	RYTRON
S	SIMPSON
SA	SANGAMO
SAR	SARAN
SE	SERVICE
SEL	SELCO
SEP	STANDARD ELECT. PROD.
SH	SHALL CROSS
SI	SIGMA
SIE	SOUTHWESTERN IND. ENG.
SKT	SARKES TARZIAN
SK	SPENCER-KENNEDY-LABS.
SM	STANLEY MORRIS
SMC	SPECIALTIES MFG.
SMI	SMITH HERMAN
SOLA	SOLA ELECTRIC
SOR	SORENSON
SP	SPRAGUE
SPR	SUPREME
SQ	SQUARE D
SR	SIERRA ELECT. CORP.
SREC	STANDARD RECTIFIER
SS	SPECTRA-STRIP
STAH	STAHLIN BROS.
STAN	STANTRON
STIM	STIMSON, E.B.
STW	STANDARD WIRE & CABLE
SU	SUPERIOR ELECTRIC
SUPT	SUPRENANT
SW	SWITCHCRAFT
SW-CT	SWITCHING CONTROL
SWGL	SWAGELOCK
SY	SYLVANIA
T	TRIAD
T & B	T & B (CONNECTORS)
TH	THERMADOR
TI	TEXAS INSTRUMENT
TIC	TECHNOLOGY INST. CORP.
TNG	TUNGSOL
TR	TRUMBEL
TRAN	TRANSELECTRONICS
TRE	TRERICE
TRIM	TRIMM
TRID	TRID LABS. INC.
TX	TEKTRONIX
UI	UNISTRUT
ULAN	ULANET CO., GEO.
UN	UNIMAX
USDC	U. S. ELECT. DEVEL.
USEC	U. S. ENG. CO.
USG	U. S. GAUGE
UTAH	UTAH
UTC	UNITED TRANSFORMER
VAL	VALOR INSTRUMENTS INC.
WA	WALSCO
WAFD	WAKEFIELD ENGR.
WAT	WATERS
WB	WARNER BRAKE
WC	WEST COAST (WESCO)
WE	WESTINGHOUSE
WEL	WELWYN
WES	WESTON
WH	WAHLGREN
WHD	WEATHERHEAD
WHIT	WHITLOCK
WIN	WINCHESTER
WK	WECKESSER
WL	WARD LEONARD
WP	WESTCAP
WRMD	WIRE MOULD
WRNE	WESTERN ELECTRIC
WSPT	WESTPORT
WYCO	WYCO METAL PROD.
YO	YOUNG RADIATOR

REVISIONS					
ZONE	CHG. LETTER	DESCRIPTION	DATE	APPROVAL	RELEASE NOTICE NO.



31745-238

APR 14 1965

TECH. MANUAL INFORMATION

ITEM	NO. REQ PER ASSY.	NAME OR PART NO.	DESCRIPTION

LIST OF MATERIAL

LING ELECTRONICS DIVISION
OF LING-TEMCO-VOUGHT INC.
ANAHEIM, CALIFORNIA

UNLESS OTHERWISE SPECIFIED
ANGULAR ± 1/2° FRACTIONS ±
DECIMAL ± .005 RMS FINISH ✓
BREAK ALL SHARP EDGES .010
RESISTORS - 1 W. - 10% CAPACITORS - MFD
CHOKE-HENRIES

APPROVED		
DRN.	NORIO	2-5-64
CHKD.	BJC	2-5-64
P.E.	NORIO	2-5-64
V.E.		

TITLE: COMPONENT LAYOUT CP-5/6

L#36031

SCALE: SIXTH NEXT ASSEMBLY

DWG. NO. 31745-238

CP-5/6
MODEL NO. DATE

FIRST USED ON

MP MASTER
MA34236